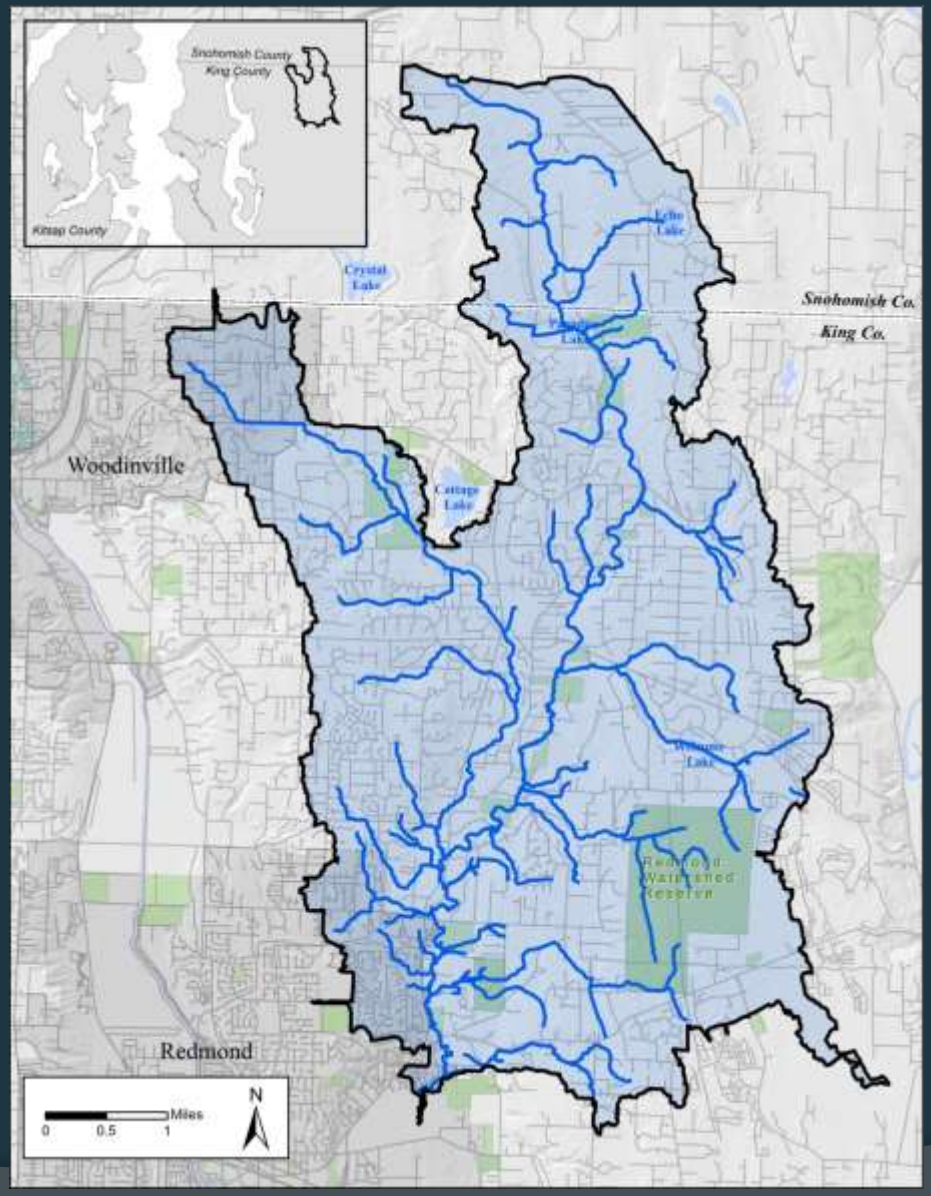
Juvenile Salmon Habitat Use in the Bear Creek Watershed

King County

Josh Kubo
Environmental Scientist
King County Water and Land Resources Division

Bear Creek Watershed

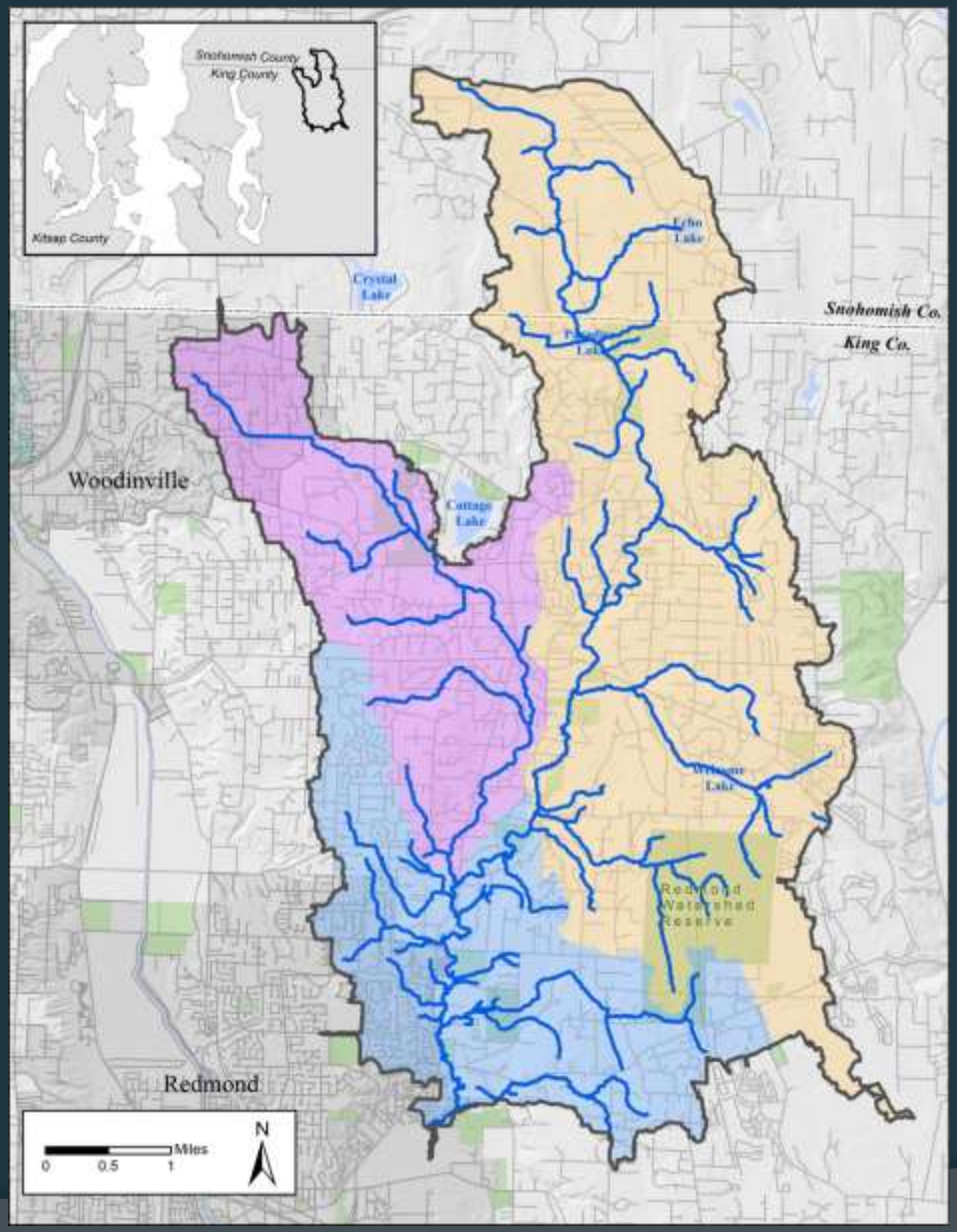


- 6 salmonid species
- Moderate-high quality habitats
- Bear Creek Watershed Stormwater Plan
- Habitat conditions and salmon use informs conservation strategies

Study Objectives

- Characterize and map instream habitat types
- Sample habitat types for juvenile salmonids
- Evaluate juvenile salmon habitat use based on differences in relative abundance
- Integrate habitat-use with existing habitat conditions

Sample Site Selection and Habitat Mapping



- Three sub-basin areas
  - Cottage
  - Upper Bear
  - Lower Bear

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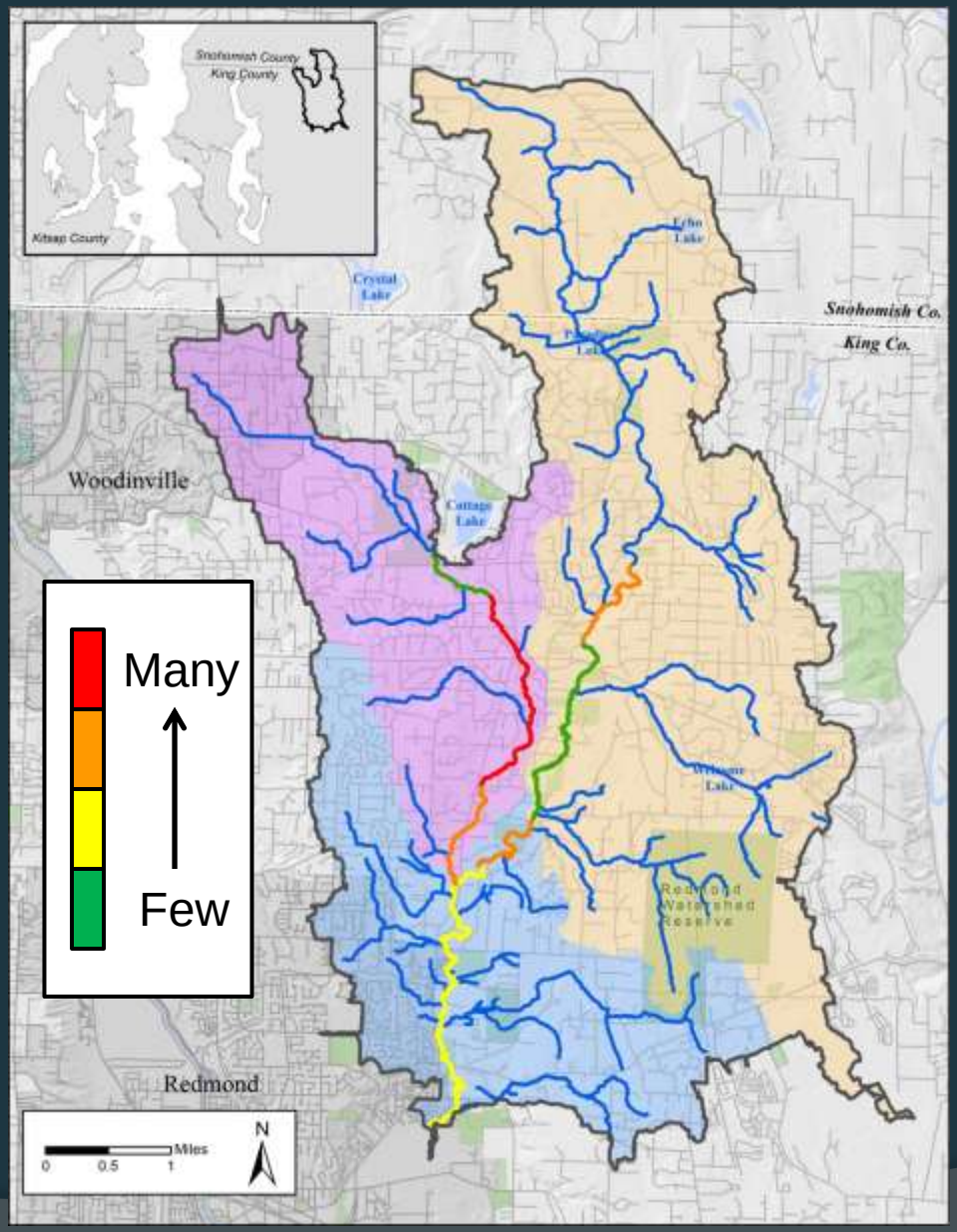

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- Salmonid redd distribution

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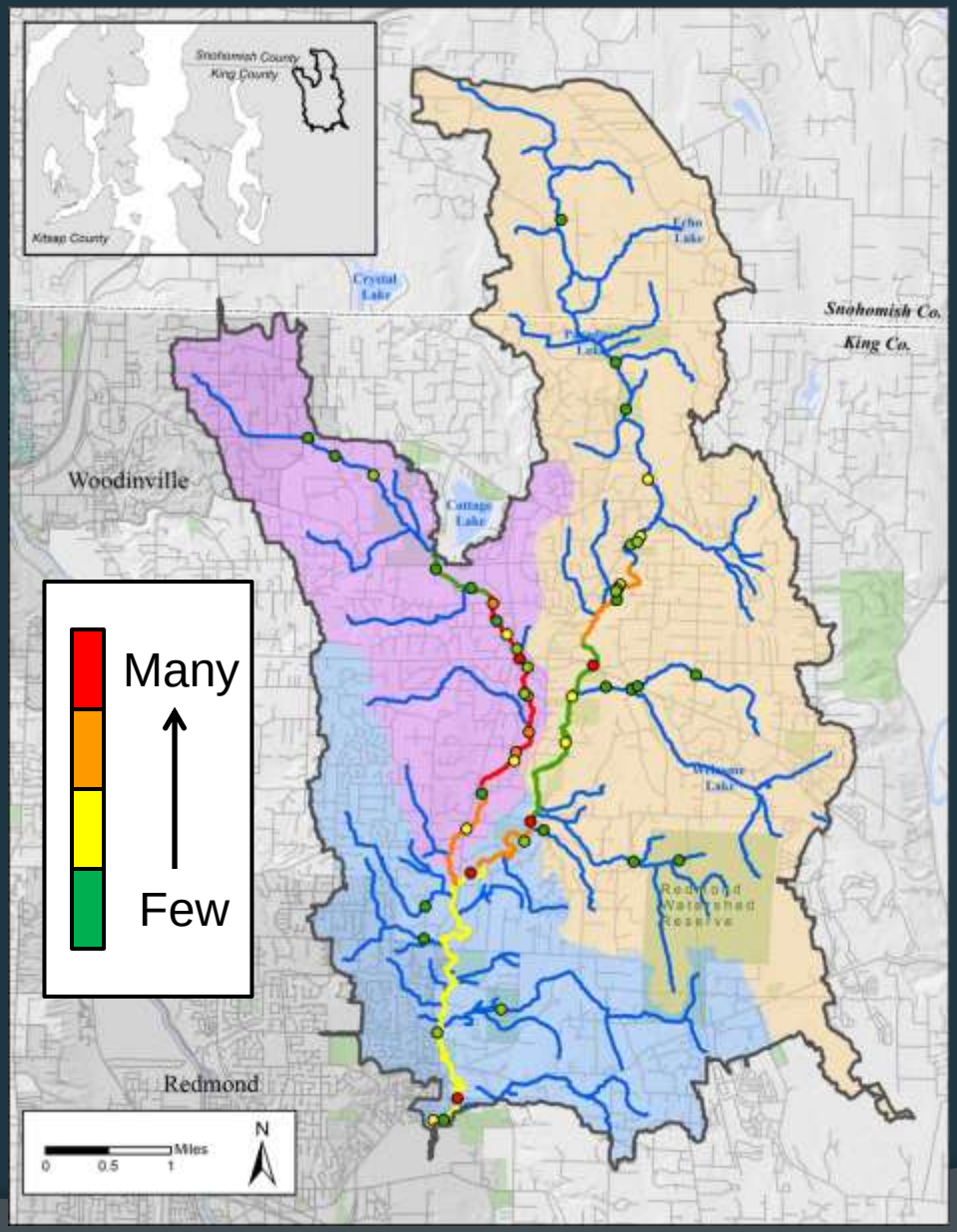

- Three sub-basin areas
  - Cottage
  - Upper Bear
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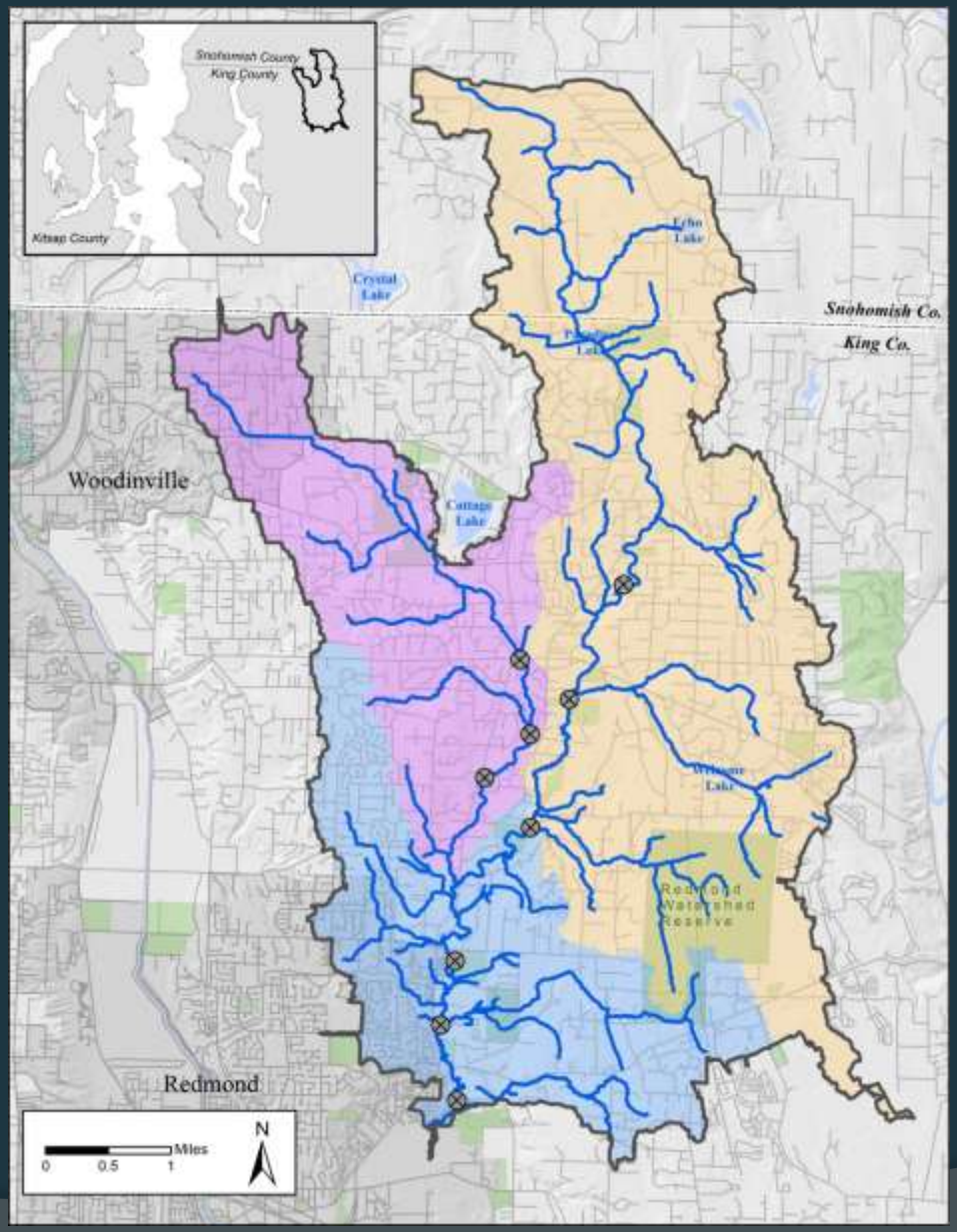
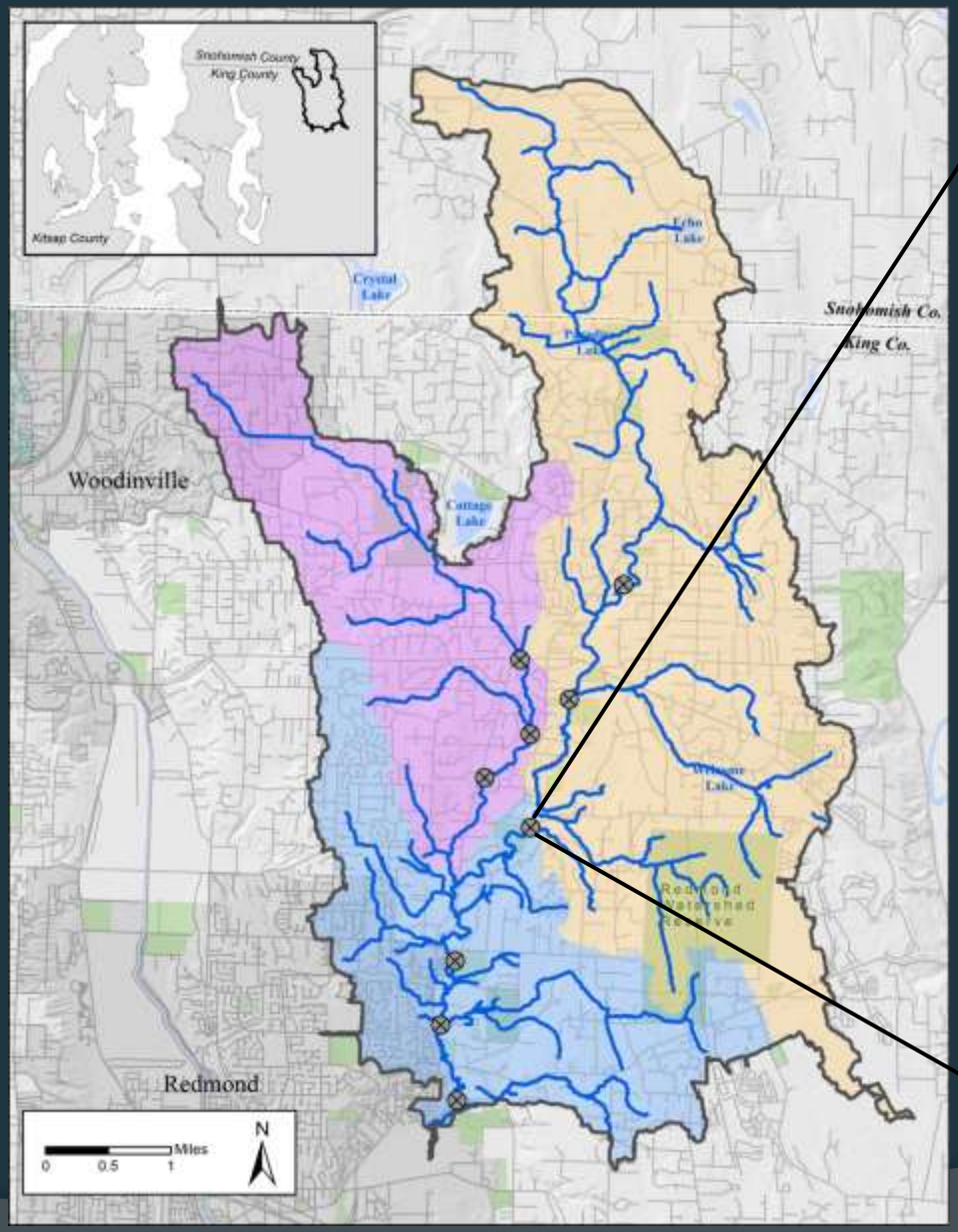
- Salmonid redd distribution
- Salmon watchers fish counts
- Landowner access

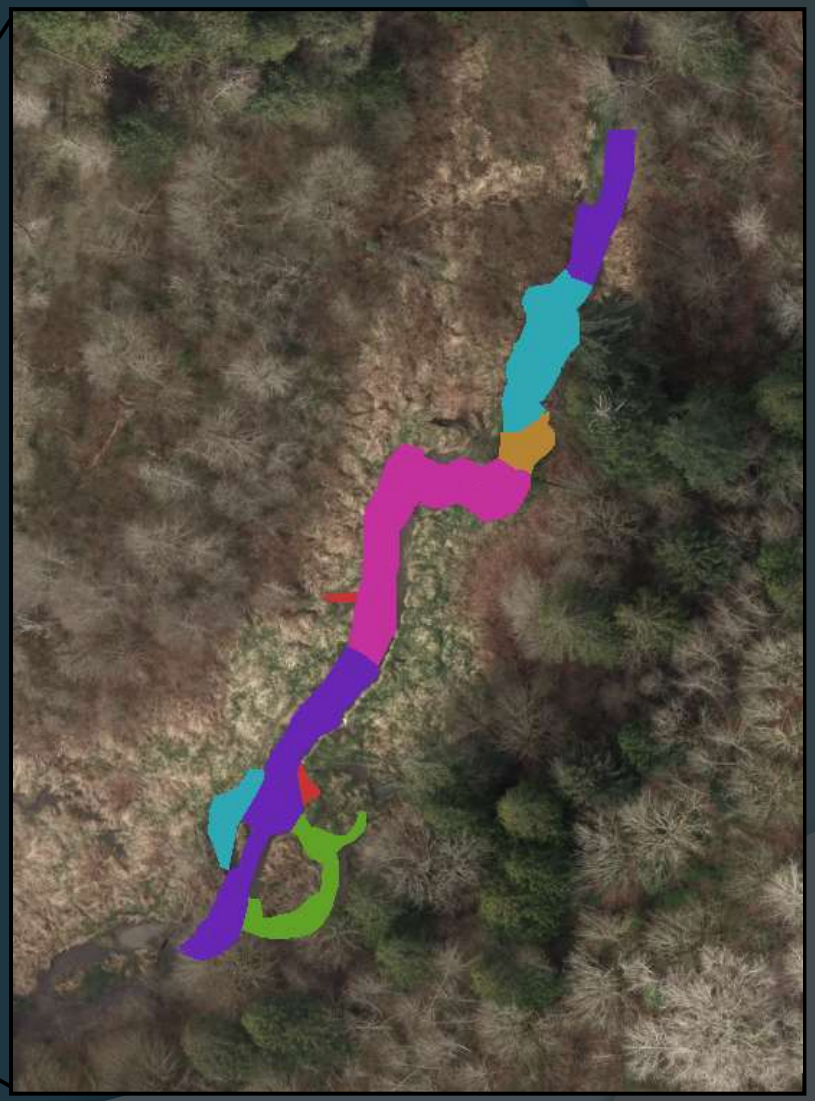
Sample Site Selection and Habitat Mapping



- Three sub-basin areas
  - Cottage
  - Upper Bear
  - Lower Bear
- Salmonid redd distribution
- Salmon watchers fish counts
- Landowner access
- Three sample sites per reach

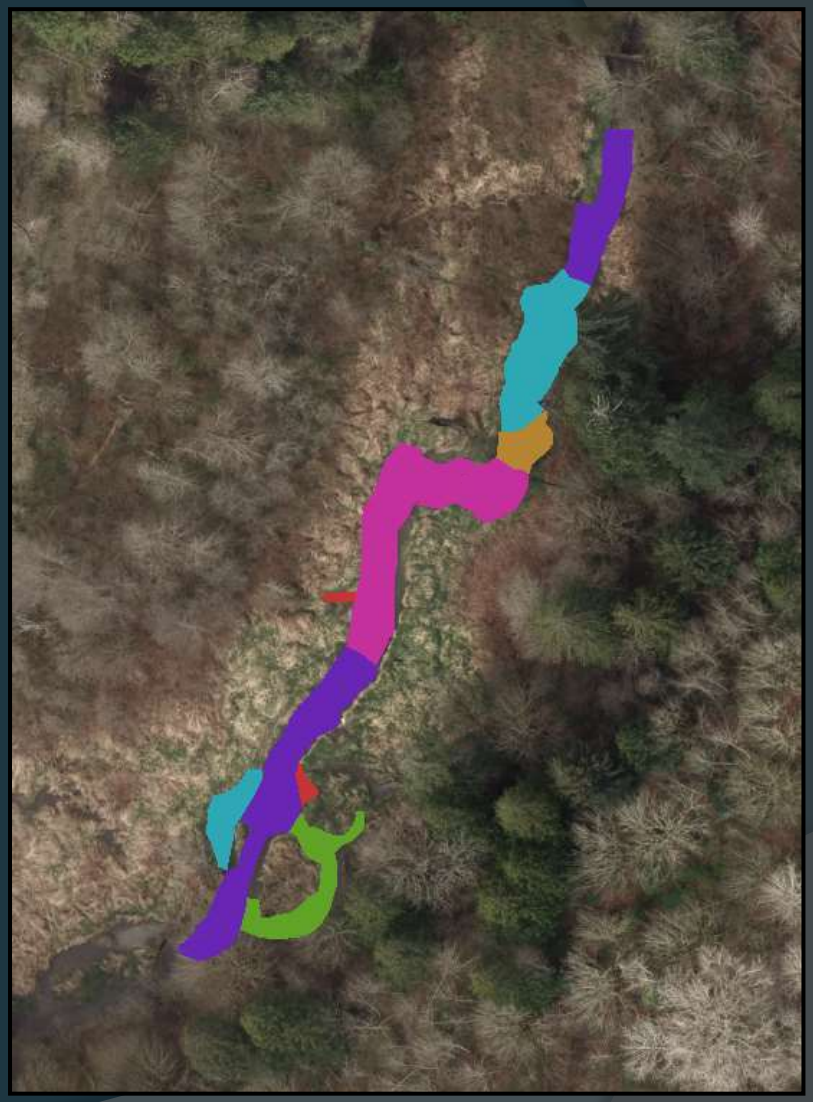
Sample Site Selection and Habitat Mapping





Sample Site Selection and Habitat Mapping

- Fast Water
  - Turbulent
    - Fall
    - Cascade
    - Rapid
    - Riffle
    - Chute
  - Non-turbulent
    - Glide
    - Run
- Slow Water
  - Scour Pool
    - Eddy
    - Trench
    - Mid-channel
    - Convergence
    - Lateral
  - Dammed Pool
    - Debris
    - Beaver
    - Landslide
    - Backwater
    - Abandoned channel
  - Side-channel
  - Tributary mouth

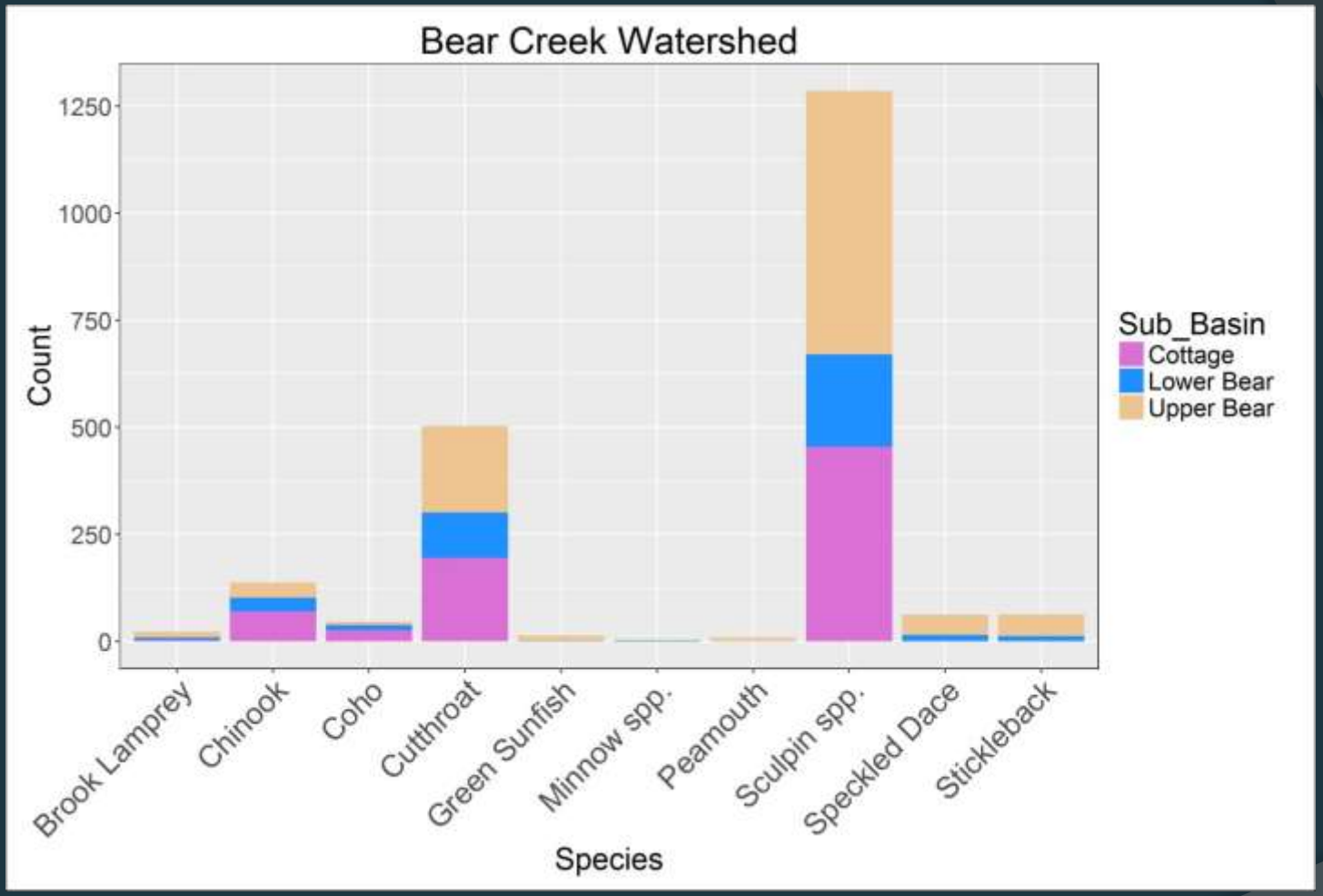


Modified from Hawkins et al. 1993

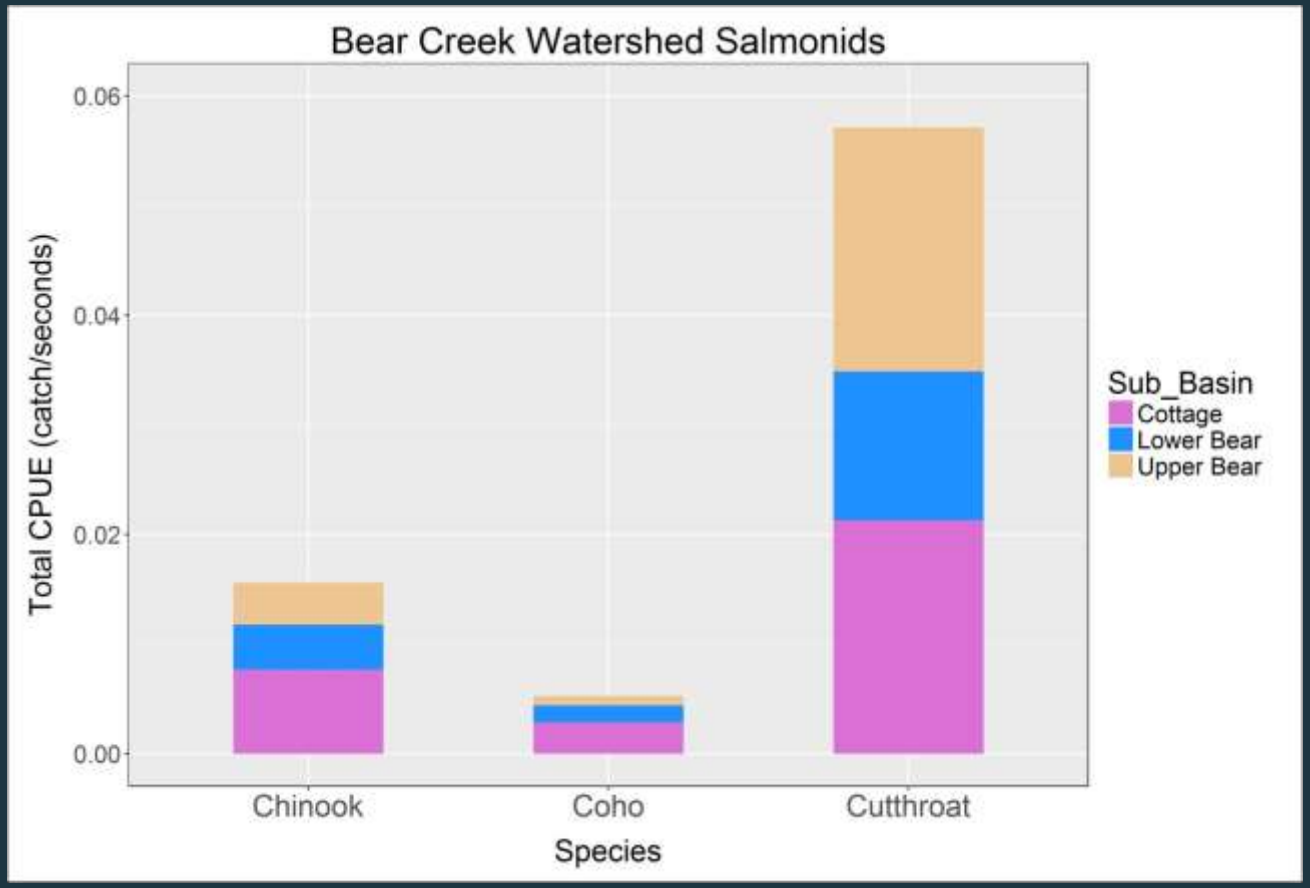
Habitat and Fish Sampling

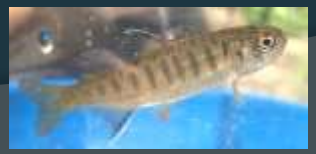
- Each habitat type was sampled within each sub-basin
- Habitats were sampled monthly from Feb – June, 2016
- Backpack electrofishing methods used to collect fish
- Collected species, length, and weight data

Catch by Sub-Basin



Salmonid Catch by Sub-Basin

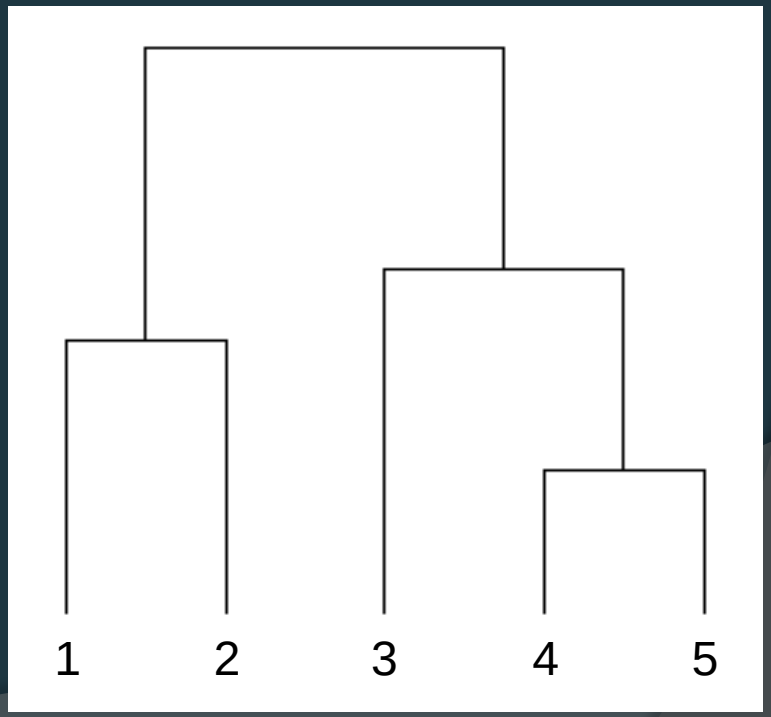




Juvenile Chinook Habitat Use

- Regression trees: recursive partitioning to separate a response variable into groups based on the values of explanatory variables
- Chinook CPUE ~ sub-basin + month + habitat type + fish cover

$$\text{CPUE} = \frac{\text{Catch}}{\text{Seconds Fished}}$$



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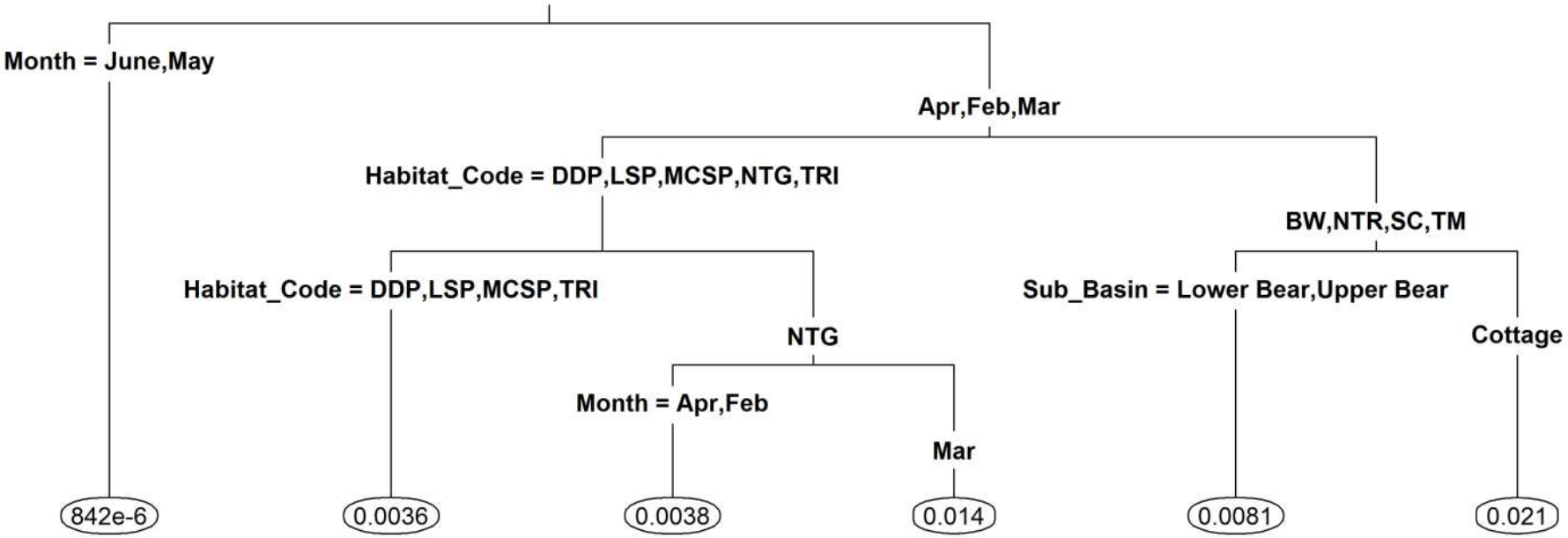
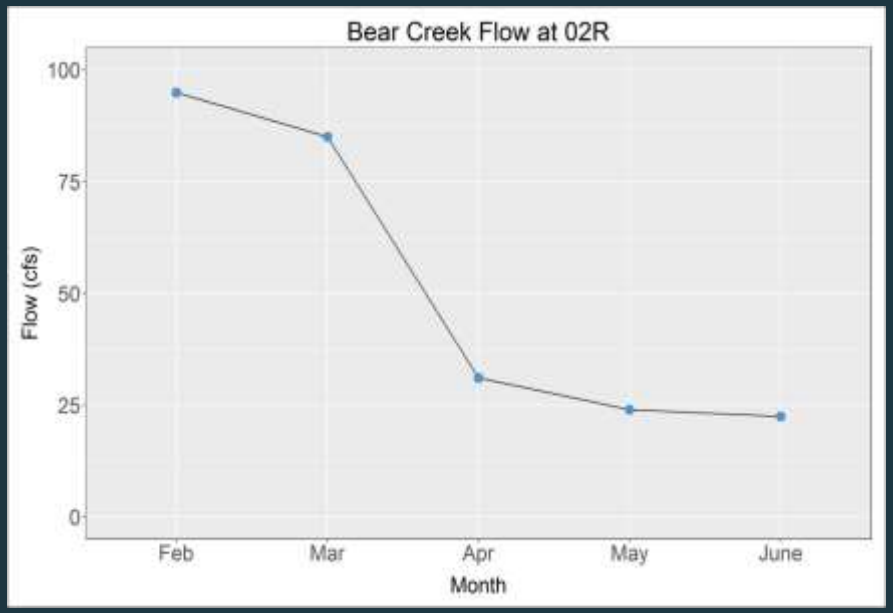
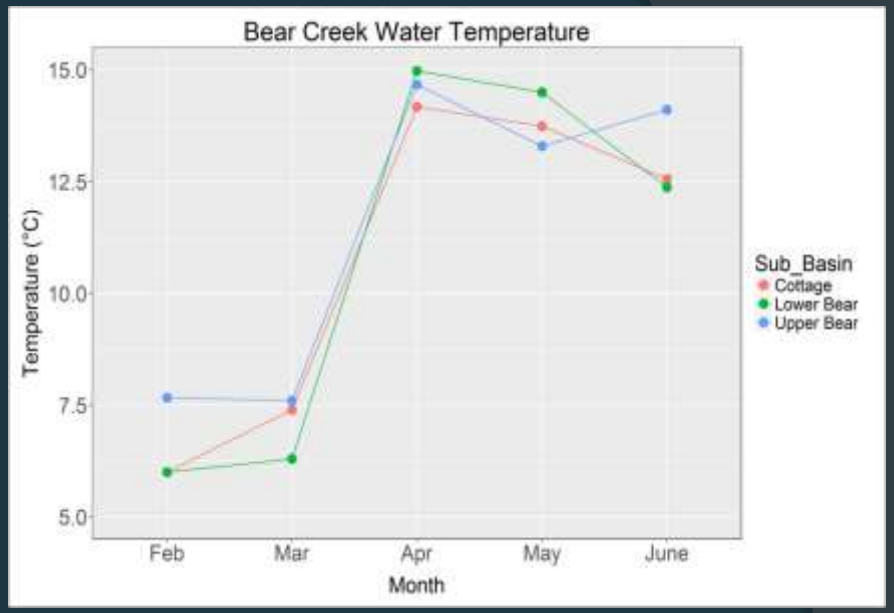


- Month, habitat type, and sub-basin influenced observed Chinook CPUE

Juvenile Chinook Habitat Use

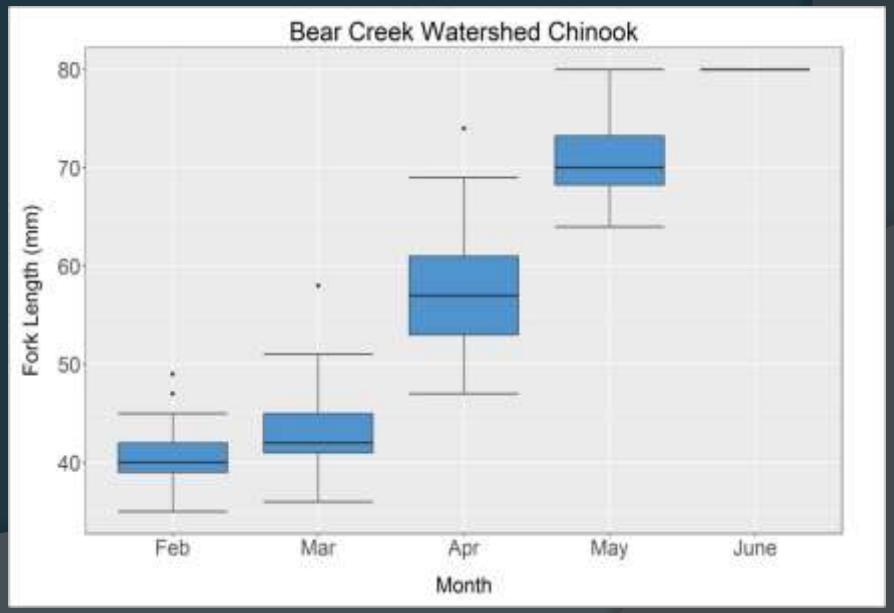




Bear Creek Chinook life stages

- Fry (small – leave early)

- Parr (larger – leave later)



Habitat Codes

- SC = Side-channel
- BW = Backwater
- TM = Tributary mouth
- DDP = Debris-dammed pool
- LSP = Lateral scour pool
- MCSP = Mid-channel scour pool
- NTG = Non-turbulent glide
- NTR = Non-turbulent run
- TRI = Turbulent riffle

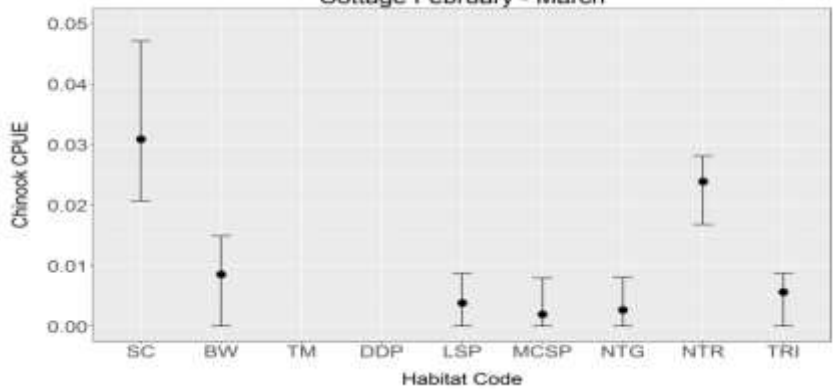
February - March

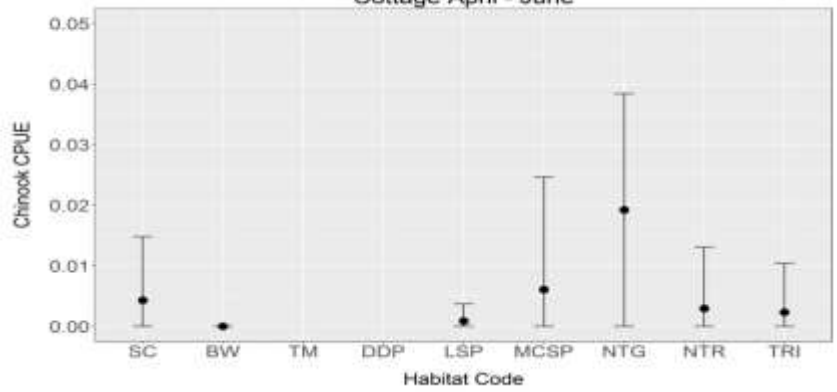
April - June

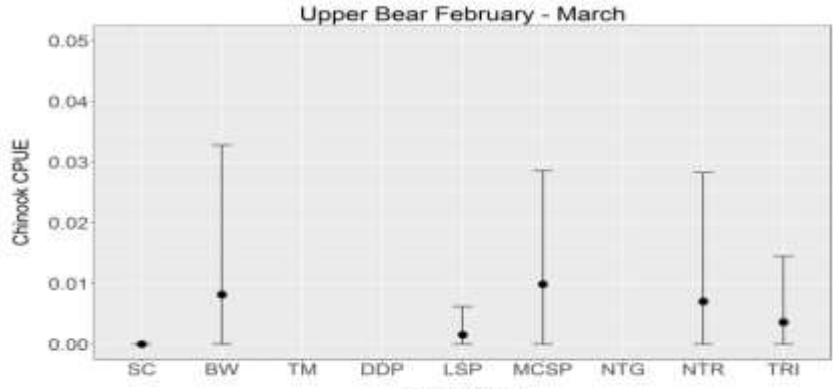
Cottage

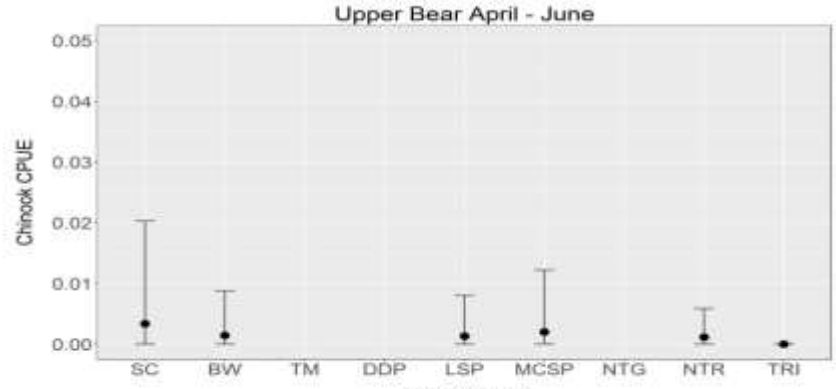
Upper Bear

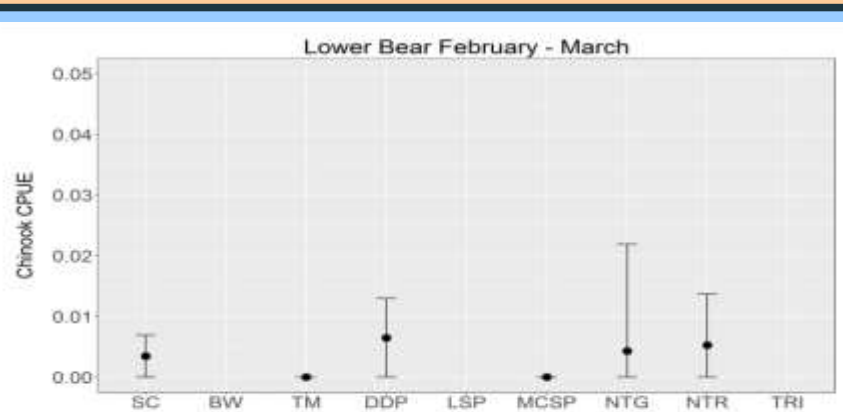
Lower Bear



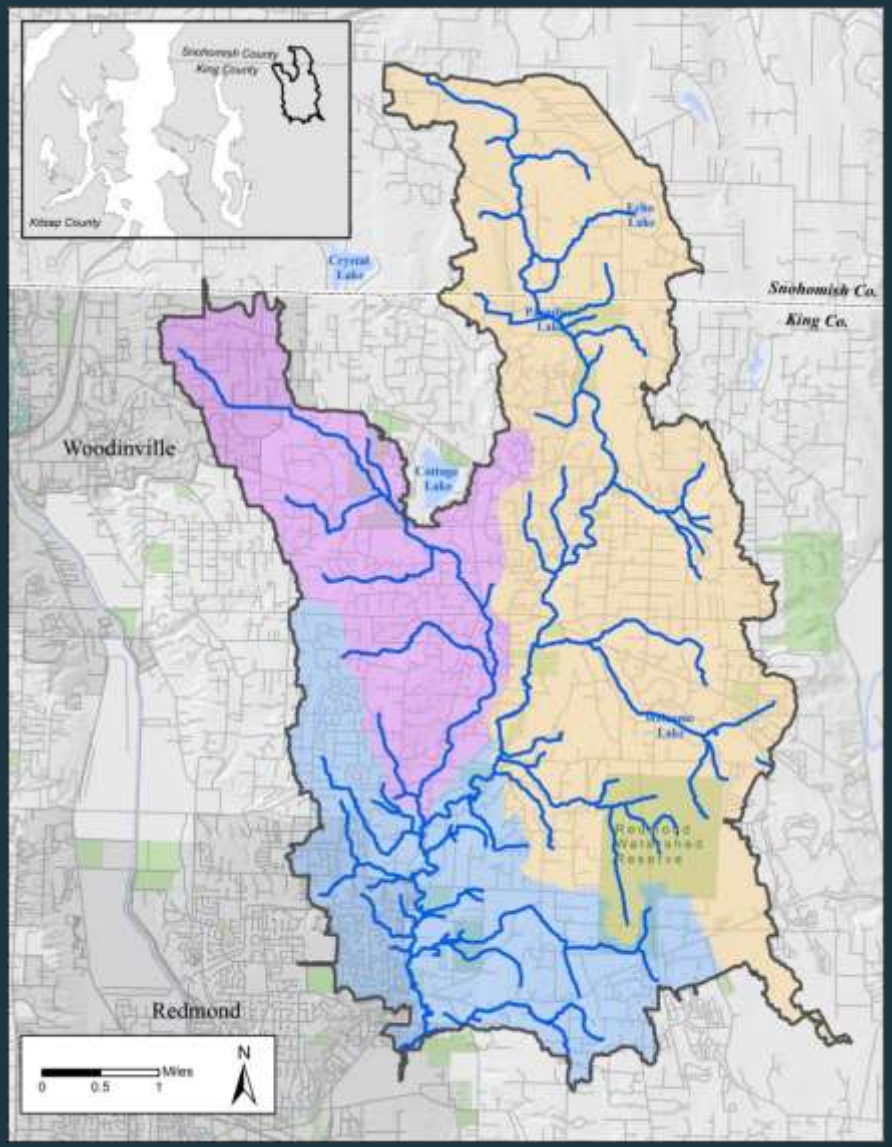








Existing Habitat Conditions



Cottage Lake Creek

- Moderate-higher quality
- Pool quality/quantity at risk
- More LWD but still below PFC

Upper Bear Creek

- Higher quality habitats
- LWD and pool quantity/quality below PFC

Lower Bear Creek

- Low-moderate habitat quality
- Poor LWD volume and frequency
- Loss of channel complexity and floodplain connectivity

Study Results:

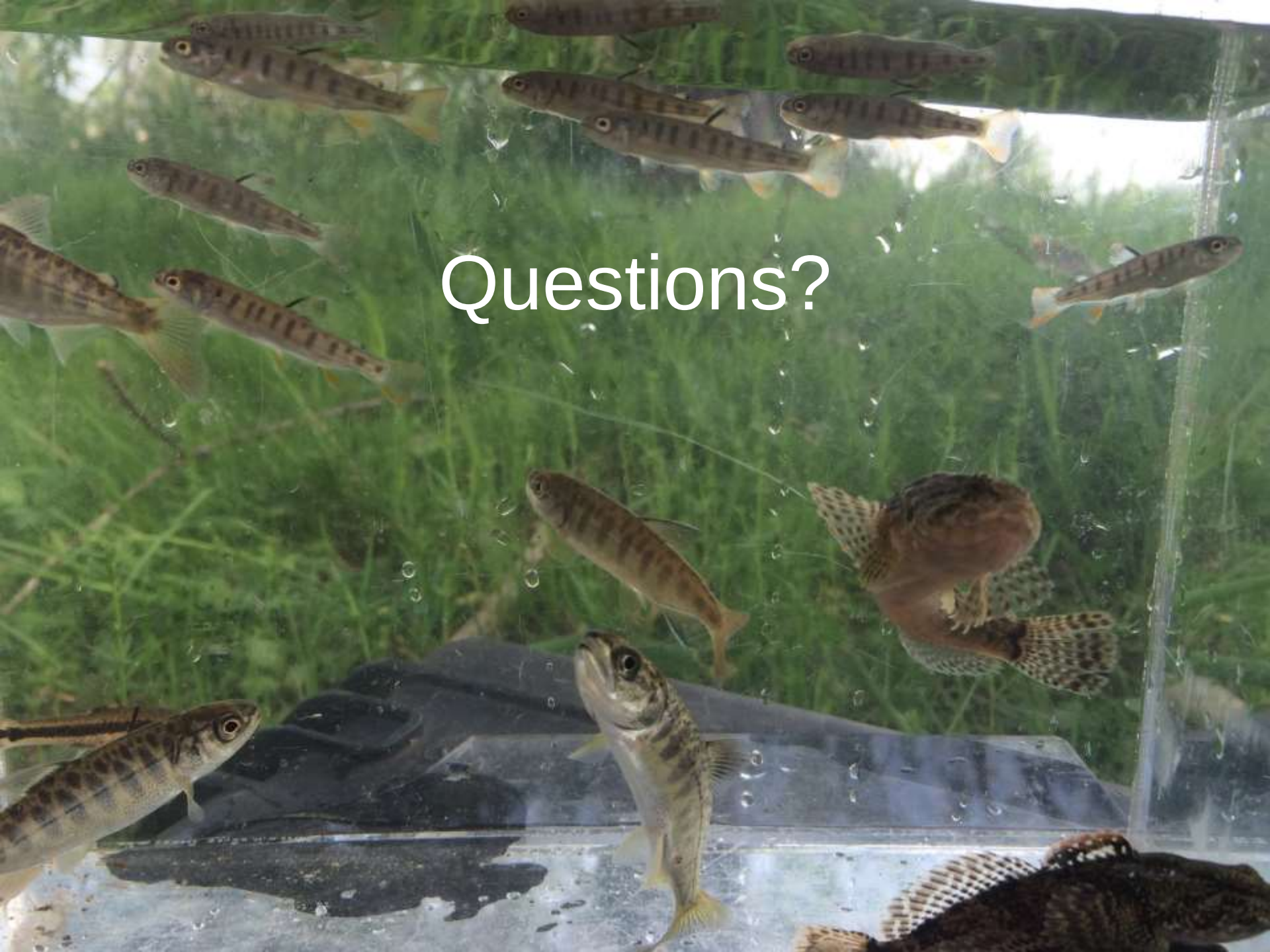
- A suite of habitat types support juvenile Chinook in the Bear Creek watershed
- The suite of habitats varies across months and sub-basins

Applications:

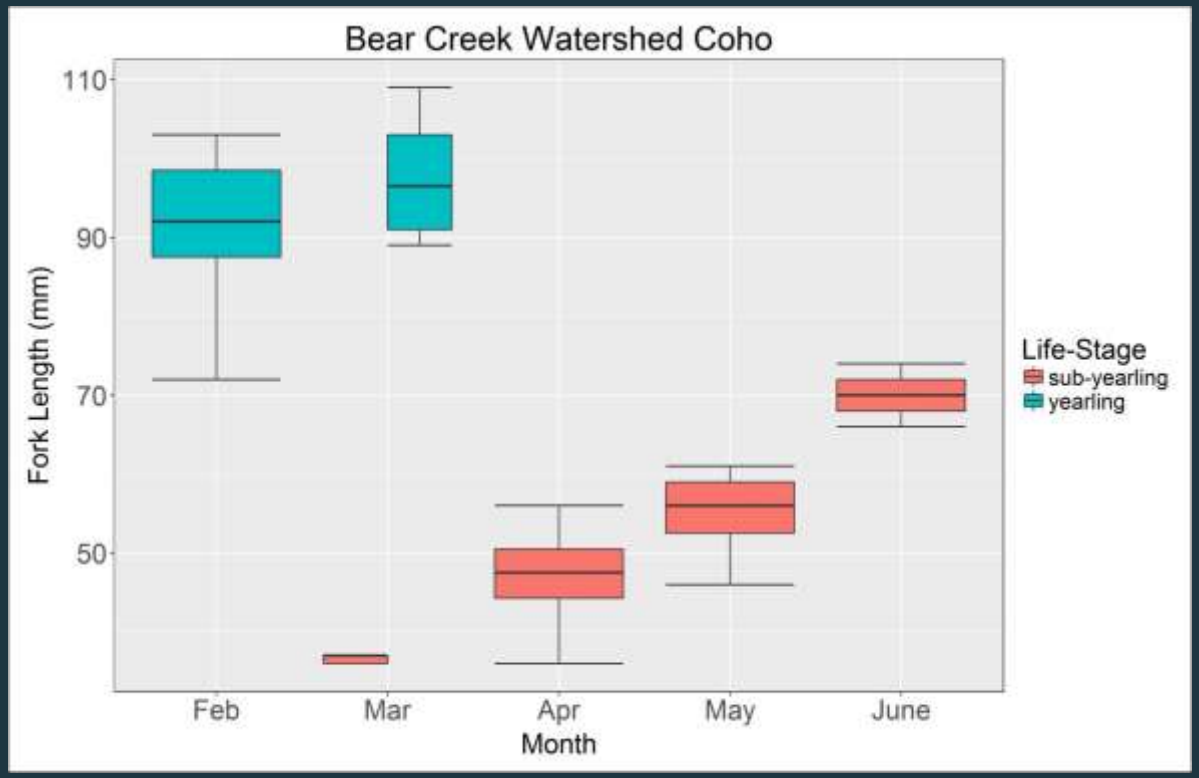
- Well-functioning riverine, floodplain, and riparian processes support a complete suite of habitat types
- Protect areas where conditions are closer to properly functioning and restore areas where conditions are degraded

Special Thanks

- Landowners in Bear Creek
- Chris Gregersen
- Dan Lantz
- Jim Bower
- Jeff Burkey
- Kate Macneale
- Curtis DeGasperi
- Steven Brady
- Andrew Miller


Questions?

Juvenile Coho Habitat Use



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